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3D MODELS OF SEISMIC WAVE PROPAGATION: SIMULATING SCENARIO EARTHQUAKES ALONG THE HAYWARD FAULT

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Advances in computer technology are making it more and more feasible to simulate realistic 3D models of geophysical phenomena. We have developed an advanced finite-difference elastic wave propagation code, which is capable of utilizing massively parallel supercomputers to simulate 3D seismic wave propagation out to large distances. This code incorporates a number of advanced features such as topography, attenuation, variable density, and propagating grids, and is being used in a number of study areas including the CTBT program, oil exploration, and earthquake research. In the present study, we will present preliminary results of simulated ground motions in the San Francisco Bay Area due to a large scenario earthquake along the Hayward fault. This fault runs through some of the most densely populated regions of the San Francisco area, and has a high probability of failing with a magnitude 6.5-7.0 earthquake within the next 30 years. Hence, the identification of regions where high amplitude ground motions are anticipated is important for seismic hazard assessment. Our preliminary model will be 100-200 km in the horizontal dimensions and approximately 50 km in depth. We plan to simulate seismic waves at frequencies approaching 1 Hz. We will utilize a 3D laterally heterogeneous model of crustal and upper mantle structure for the San Francisco Bay Area, based on data gathered from geologic, tomographic, seismic reflection, gravity, and other studies (for example, see Antolik et al., this volume).

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